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Podosporiopsis, a new genus of synnematous hyphomycetes from China

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Abstract—*Podosporiopsis* gen. nov. is proposed. It is characterized by distinct unbranched conidiophores forming distinct synnematal conidiomata with emergent monotretic, integrated, terminal, determinate or percurrently extending conidiogenous cells that produce solitary, obclavate, distoseptate conidia. *Podosporiopsis sinensis* sp. nov. (the type species) and *P. obclavata* sp. nov., both collected on dead branches of unidentified plants in China, are described and illustrated. A key to *Podosporiopsis* and similar genera is provided.

Key words—anamorphic fungi, asexual morph, taxonomy

Introduction

Lushan Mountain is a world heritage site in Jiangxi Province, China, south of the Yangtze River and northwest of Poyang Lake. It covers 302 km^2 and is protected by an outlying buffer zone of 500 km^2. However, its mycobiota, especially of saprobic microfungi, are poorly known. During our continuing mycological surveys (2012–15) in this region, two novel synnematous hyphomycetes were encountered on dead branches. Close examination showed significant differences from previously described hyphomycetes, and a new genus, *Podosporiopsis,* is erected for them.

Materials & methods

At the end of rainy season, samples of dead branches were collected from humid or riparian environments, and processed as described by Ma et al.

(2012). Conidia and conidiophores were measured and photographed using a Nikon Eclipse E200 with 100× (oil immersion) objectives and SmartV550Dc digital camera. Adobe Photoshop 7.0 was used to process images into plates, with backgrounds replaced for esthetic reasons. The specimens studied are deposited in the Plant Pathology Herbarium, Jiangxi Agricultural University, Nanchang, China (HJAUP), and the Mycological Herbarium, Institute of Microbiology, Chinese Academy of Sciences, Beijing, China (HMAS; http://hmas.im.ac.cn).

Taxonomy

Podosporiopsis Jian Ma, X.G. Zhang & R.F. Castañeda, **gen. nov.**

Index Fungorum IF 551862

Differs from *Podosporium* by its distoseptate conidia.

Type species: *Podosporiopsis sinensis* Jian Ma et al.

Etymology: refers to its similarity to *Podosporium*.

Conidiomata synnematous, solitary, erect, cylindrical, indeterminate, dematiaceous. Conidiophores synnematous, unbranched, septate, dematiaceous. Conidiogenous cells diverging from the synnematal axis, monotretic, integrated, terminal, determinate or with percurrent extensions. Conidial secession schizolytic. Conidia solitary, dry, acrogenous, distoseptate.

Podosporiopsis sinensis Jian Ma, X.G. Zhang & R.F. Castañeda, **sp. nov.** Figs 1, 2

Index Fungorum IF 551863

Differs from *Podosporium* spp. by its distoseptate conidia.

Type: China, Jiangxi Province: Lushan Mountain, on dead branches of an unidentified broadleaf tree, 8 November 2014, J. Ma (**Holotype**, HJAUP M0279-1; **isotype**, HMAS 245604).

Etymology: refers to the country in which the fungus was collected.

Colonies effuse on the natural substratum, dark brown to black, hairy. Mycelium partly superficial, partly immersed in the substratum. Conidiomata synnematous, solitary, erect, cylindrical, dark brown to black, becoming narrower toward the apex, up to 1000 µm high, 100–120 µm wide at the often swollen base, fertile region with more than half the length of the synnemata. Conidiophores distinct, synnematous, cylindrical, unbranched, septate, smooth, brown to dark brown, up to 1000 µm long, 6–10 µm wide, diverging laterally and terminally. Conidiogenous cells monotretic, integrated, terminal, cylindrical, smooth, brown, determinate, or sometimes with 1–2 cylindrical percurrent extensions, 12–27 × 6–8.5 µm. Conidial secession schizolytic. Conidia solitary, dry, acrogenous, smooth, straight or curved,

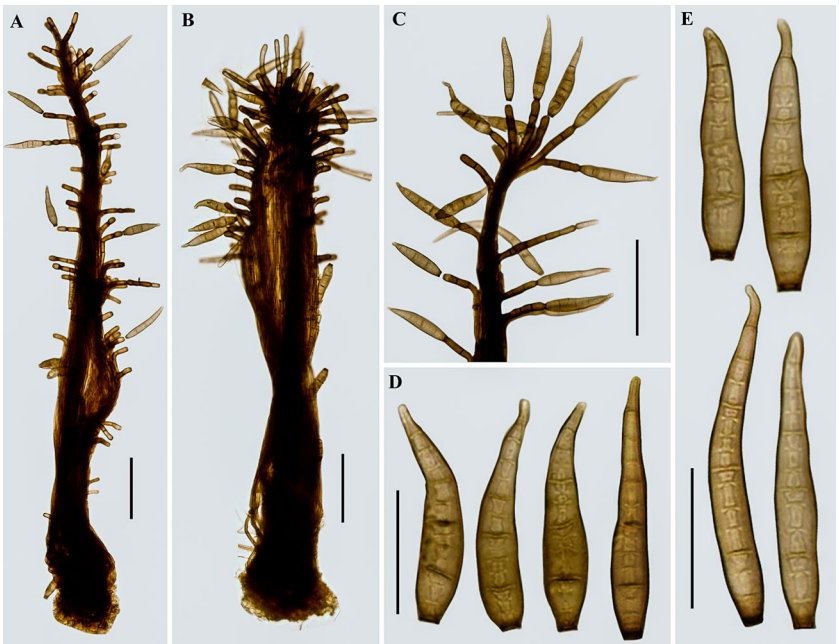

Fig. 1. *Podosporiopsis sinensis* (holotype, HJAUP M0279–1): A–C. Synnemata with conidiophores and conidia; D, E. Conidia. Scale bars: A–C = 100 μm; D, E = 40 μm.

obclavate, 10–14-distoseptate, pale brown to brown, 65–97 μm long, 10–15 μm thick at the widest part, tapering to 3–4.5 μm at the apex, 5–7 μm wide at the truncate base.

Podosporiopsis obclavata Jian Ma, X.G. Zhang & R.F. Castañeda, sp. nov. Figs 3, 4

Index Fungorum IF 551864

Differs from *Podosporiopsis sinensis* by its longer and narrower, 8–20-distoseptate conidia with the truncate base narrower than the apex.

Type: China, Jiangxi Province: Lushan Mountain, on dead branches of an unidentified broadleaf tree, 8 November 2014, J. Ma (**Holotype**, HJAUP M0279-2; **isotype**, HMAS 245605).

Etymology: *obclavata*, referring to the obclavate conidia of this fungus.

Colonies effuse on the natural substratum, dark brown to black, hairy. Mycelium partly superficial, partly immersed in the substratum. Conidiomata synnematous, solitary, erect, cylindrical, dark brown to black, becoming narrower toward the apex, ≤1420 μm tall, 65–170 μm diam. at the often

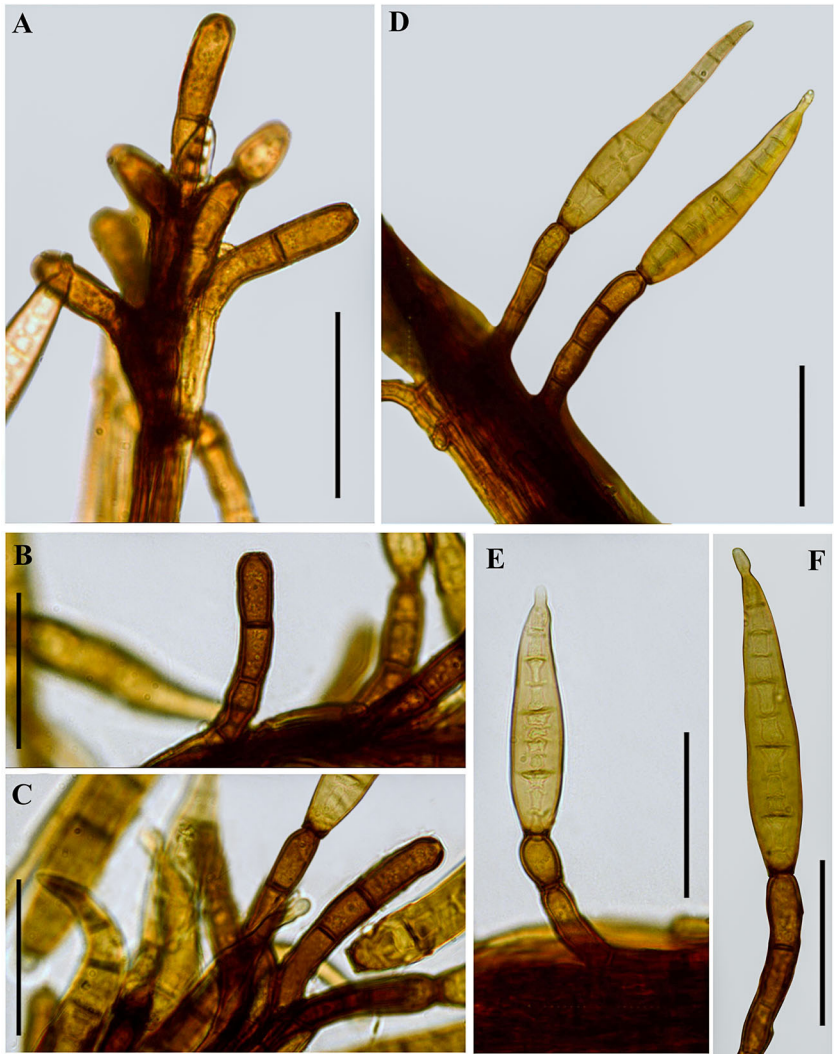

Fig. 2. *Podosporiopsis sinensis* (holotype, HJAUP M0279–1): A–C. Conidiophores with terminal, monotretic conidiogenous cells; D–F. Conidiophores with terminal conidia and 0–1 percurrent extension. Scale bars = 40 μm.

swollen base, fertile region with more than half the length of the synnemata. Conidiophores distinct, synnematous, cylindrical, unbranched, septate, smooth, brown to dark brown, ≤1400 μm long, 5–7.5 μm diam., diverging

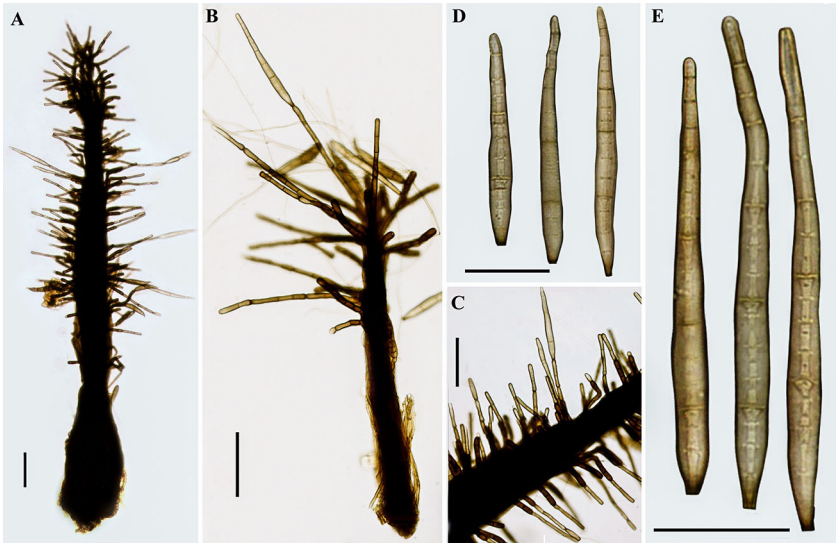

Fig. 3. *Podosporiopsis obclavata* (holotype, HJAUP M0279–2): A–C. Synnemata with conidiophores and conidia; D, E. Conidia. Scale bars: A = 100 μm; B, C = 80 μm; D, E = 40 μm.

laterally and terminally. Conidiogenous cells monotretic, integrated, terminal, cylindrical, smooth, brown to pale brown, determinate or sometimes with 1–2 cylindrical percurrent extensions, 20–40 × 5–6.5 μm. Conidial secession schizolytic. Conidia solitary, dry, acrogenous, smooth, straight or curved, obclavate, 8–20-distoseptate, pale brown, 95–160 μm long, 8–11 μm diam. at the widest part, tapering to 3.5–5.5 μm at the apex and 2–4 μm at the truncate base.

Discussion

Podosporiopsis sinensis and *P. obclavata* are unique in having distinct unbranched conidiophores forming synnematous conidiomata, and solitary obclavate distoseptate conidia seceding schizolytically from monotretic, integrated, terminal, determinate or percurrently extending conidiogenous cells diverging from the axis of the synnemata. We initially thought of assigning them to the genus *Podosporium* Schwein. (Schweinitz 1832), but the conidia in *Podosporium* are euseptate rather than distoseptate, and the addition of these species would have significantly broadened its generic concept. Furthermore, conidial septation (euseptate vs distoseptate) has often been used as a generic character to divide otherwise morphologically similar fungi (e.g., *Ellisembia* vs *Sporidesmium*, *Linkosia* vs *Stanjehughesia*, *Sporidesmiella* vs *Repetophragma*,

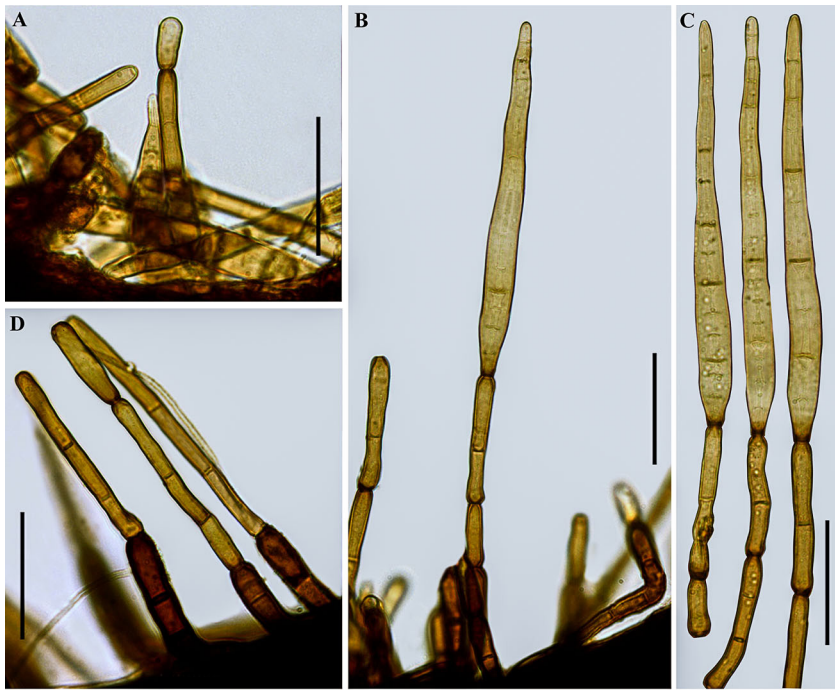

Fig. 4. *Podosporiopsis obclavata* (holotype, HJAUP M0279–2): A. Conidiophore with developing conidium; B, C. Conidiophores with terminal conidia, conidiogenous cells, and percurrent extensions; D. Conidiophores with terminal, monotretic conidiogenous cells and percurrent extensions. Scale bars = 40 µm.

Solicorynespora vs *Corynespora*, and *Parablastocatena* vs *Blastocatena*) and provides a narrow generic concept (Seifert et al. 2011; Zhang et al. 2012). Such distinctions also help avoid confusion and complexity in a number of hyphomycete genera and facilitate the morphological division of larger genera into smaller units (Subramanian 1992; McKenzie 1995; Wu & Zhuang 2005). For these reasons, we propose the new genus *Podosporiopsis* to accommodate *P. sinensis* and *P. obclavata*.

Podosporiopsis resembles *Dendrographium* Massee (Massee 1892), *Exosporium* Link (Link 1809), *Corynespora* Güssow (Güssow 1906), and *Solicorynespora* R.F. Castañeda & W.B. Kendr. (Castañeda-Ruíz & Kendrick 1990) in possessing distinct conidiophores with tretic conidiogenesis. However, in *Dendrographium* and *Exosporium* conidiogenesis is polytretic, in contrast to the monotretic conidiogenesis of *Podosporiopsis*. Conidiogenesis

in *Corynespora* and *Solicorynespora* is the same as in *Podosporiopsis*, but *Podosporiopsis* has synnematous conidiomata not found in *Corynespora* and *Solicorynespora*.

Several other genera including *Gangliostilbe* Subram. & Vittal (Vittal 1976), *Novozymia* W.P. Wu (Wu & Zhuang 2005), *Neosporidesmium* Mercado & J. Mena (Mercado Sierra & Mena Portales 1988), *Raizadenia* S.L. Srivast. (Srivastava 1981), and *Annellophragmia* Subram. (Subramanian 1963) have morphological characters similar to those of *Podosporiopsis*. However, conidiogenesis is polyblastic sympodial in *Annellophragmia,* monoblastic with percurrent extension in *Novozymia,* and monoblastic but producing euseptate conidia in *Gangliostilbe,* all of which differ from the monotretic conidiogenesis of *Podosporiopsis*. Conidia in *Neosporidesmium* and *Raizadenia* are distoseptate but conidiogenesis is monoblastic, an obvious difference from *Podosporiopsis*.

Key to Podosporiopsis and morphologically similar genera

1. Conidiogenous cells enteroblastic **2**
1. Conidiogenous cells holoblastic **7**

2. Conidiogenous cells polytretic **3**
2. Conidiogenous cells monotretic **4**

3. Conidiophores divergent from synnematal capitulum, conidia with an non-darkened hilum ..... *Dendrographium*
3. Conidiophores mononematous or divergent from stipe and synnematal capitulum, conidia with a conspicuously darkened hilum ..... *Exosporium*

4. Conidiophores mononematous **5**
4. Conidiophores synnematous **6**

5. Conidia distoseptate ..... *Corynespora*
5. Conidia euseptate ..... *Solicorynespora*

6. Conidia distoseptate ..... *Podosporiopsis*
6. Conidia euseptate ..... *Podosporium*

7. Conidiogenous cells polyblastic ..... *Annellophragmia*
7. Conidiogenous cells monoblastic **8**

8. Conidiophores divergent from stipe and synnematal capitulum **9**
8. Conidiophores divergent from synnematal capitulum **10**

9. Conidiogenous cells with annellidic percurrent proliferation ..... *Novozymia*
9. Conidiogenous cells determinate or with lageniform, ampulliform, or doliiform proliferation ..... *Neosporidesmium*

10. Conidia distoseptate ..... *Raizadenia*
10. Conidia euseptate ..... *Gangliostilbe*

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